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7 August 1980

Japan Report

(FOUO 18/80)

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POLITICAL AND SOCIOLOGICAL

JCP'S MIYAMOTO GIVES SPEECH ON PARTY'S 50TH ANNIVERSARY

OW161003 Tokyo JPS in English 0854 GMT 16 Jul 80

[Text] Tokyo, 16 Jul--The Japanese Communist Party on July 15 celebrated its 58th founding anniversary. A reception was held by the Central Committee on the evening of that day at Chinzanso in Tokyo, and some 1,000 people from various circles attended it.

Kenji Miyamoto, chairman of the Presidium of the party spoke at the reception. In which he reviewed, especially in this year, the deals of socialism and communism--spirit of the foundation of the party [as received]. He said that the party is determined to make every effort upholding higher the goal of a "society of truely equal and free relations between people".

On the present situation, he said:

"During this past year there has taken place one important incident after another, both at home and abroad. We regard the present situation contains something that deserves our serious preoccupation. By and large, our country is entering into a period of the second reactionary offensive, following the first one which came at the time of the Korean war of 1950. I pointed it out during the election campaign. Unfortunately this has been confirmed by the election results.

Internationally, a new war is being unprecedentedly strengthened, and in this connection Japan is following the line of militarization in subordination to the United States. In addition, using various hegemonistic errors by some socialist countries as the best pretext, the imperialist camp is following the policy of intensifying tensions, in which Japan is being involved. This is the situation in which the reactionary offensive is gaining momentum.

This situation involves such a serious aspect that most opposition parties are more or less keeping steps with the Liberal Democratic Party in its basic policy of maintaining the Japan-U.S. military alliance in subordination to the United States and anti-communism, a basic way of dividing the progressive forces. Fundamentally it was this political situation that has allowed the LDP to "win a stable majority" in spite of its involvement in corruption and jobbery.

We cannot but remember some lessons of prewar days. One is that in prewar days, Japanese militarism entered into the "Japan-Germany-Italy anti-Comintern pact", and galloped on the road of militarism, fascism and aggression of other countries, with anti-communism as its supreme national policy. Another serious lesson is that many of those involved in the proletarian political party movement and trade union movement in Japan, which had called for "anti-capitalism, anti-communism and anti-fascism", were finally brought together for imperial rule assistance politics which upheld only anti-communism.

Of course, the reactionary offensive in its present phase must not be allowed to be consolidated and perpetuated. The Liberal Democratic Party won "a stable majority" of the seats in the Diet, but again failed to win a majority of the votes cast in the recent elections for both houses. The serious contradictions of the basic policy line of the LDP in relation to the people will inevitably become deeper.

The course for Japan to choose in the 1980s should not be one of strengthening the military alliance and rearmament in subordination to the United States, but one of dissolving military blocs and defending democracy and the people's living. It should not be the way for splitting the progressive forces with anti-communism, but the way for unity of action to stop the reactionary offensive and for a progressive united front for a change in the basic policy line of the LDP. In some historical phases we may be forced to take complicated steps in zigzags, but it is clear that a sure victory is ahead of us on our road. We are sure that the day will come when broad Japanese democratic forces who desire social progress and progressive change in their country, including conscientious social democrats, will finally take this direction. I sincerely hope that that day will come as soon as possible before we suffer too much sacrifice that can be avoided. And now we hope that forums for a progressive united front being organized throughout the country will play a significant historic role in opening up this great road.

At the same time, the Japanese Communist Party, as the genuine progressive opposition party, is determined to do its utmost to squarely confront all reactionary offensives and build a great breakwater in defense of the people.

On the international scene, the hegemonistic errors committed by some socialist countries are inflicting and disappointing many conscientious people. But these are never errors inevitably pertaining to the cause of socialism and communism. At the time of founding socialism in Soviet Russia, Lenin showed the attitude to fully respect national self-determination; and with the promulgation of the "decree of peace" he willingly renounced the claim to territories and privilege which the czarist Russia had plundered from other countries. This example still encourages us today, showing what the cause of socialism is.

Most socialist countries started in an extremely backward economy. In spite of this limitation, they abolished exploitation and have achieved good

results in improving social security, establishing equal rights between men and women, and in other areas such as medical care, housing and education. These are achievements which a capitalist society cannot afford. I myself have directly witnessed these achievements in socialist countries.

Earnestly desiring that the true character of socialism as the strict defender of peace and sovereignty of nations will totally be embodied in international policy, we shall continue to express courageously and frankly our party's principled position at the international level. This constitutes one of the important international duties of the party of self-reliance and independence. A reply has recently been received from the Central Committee of the Communist Party of the Soviet Union to my letter of last June addressed to the CPSU General Secretary L. I. Brezhnev. As to talks between the delegations of the two parties, it expresses its agreement in principle. To our regret, the differences of opinion between the two parties on Afghanistan issue remain serious. In view of world peace and progress, our party will sincerely deal with other parties with which we have different views on important issues."

CSO: 4120

[redacted]

POLITICAL AND SOCIOLOGICAL

JUNE MONTHLY OPINION POLL

OW051313 Tokyo JIJI in English 1240 GMT 5 Jul 80

[Text] Tokyo (JIJI Press)--Following are the results of a monthly opinion poll conducted by JIJI Press June 10-13 (figures in parentheses show the previous month's results):

Question: Do you support the cabinet of Prime Minister Masayoshi Chira?

Yes: 27.3 percent (29.1 percent)
No : 43.9 percent (42.1 percent)
I don't know: 28.8 percent (28.7 percent)

Question: What political party do you support?

Liberal-Democratic Party: 30.0 percent (28.9 percent)
Japan Socialist Party: 10.1 percent (8.3 percent)
Komeito (Clean Government Party): 3.5 percent (3.4 percent)
Japan Communist Party: 2.2 percent (1.6 percent)
Democratic Socialist Party: 3.4 percent (2.7 percent)
New Liberal Club: 0.4 percent (0.3 percent)
Other parties: 0.2 percent (-)
Conservative rather than reformist parties: 5.5 percent (8.6 percent)
Reformist rather than conservative parties: 6.3 percent (6.7 percent)
No party: 32.5 percent (31.6 percent)
I don't know: 6.1 percent (5.8 percent)

Question: How do you feel about price trends?

Calming down: 5.1 percent (3.7 percent)
Rising: 89.6 percent (92.2 percent)
Dropping: 1.3 percent (0.5 percent)
I don't know: 4.0 percent (3.6 percent)

Question: What do you think of the domestic business trends compared with May?

Definitely picking up: 0.1 percent (-)
Slightly better: 7.7 percent (7.5 percent)

No change: 49.7 percent (42.3 percent)
Slightly worsening: 27.0 percent (31.8 percent)
Definitely worsening: 5.5 percent (6.8 percent)
I don't know: 10.0 percent (11.6 percent)

Question: Do you think Japan should align with the free world or the Communist bloc, or stay neutral?

Free world: 50.6 percent (47.7 percent)
Communist bloc: 1.9 percent (1.4 percent)
Neutrality: 27.1 percent (27.7 percent)
I don't know: 20.4 percent (23.2 percent)

Question: Please list up to three nations you like.

Switzerland 40.0 percent (38.5 percent), the United States 39.1 percent (34.2 percent), France 26.0 percent (28.5 percent), Britain 25.2 percent (24.9 percent), China 18.0 percent (17.9 percent), West Germany 16.1 percent (16.0 percent), India 1.5 percent (3.3 percent), the Soviet Union 0.9 percent (1.1 percent), South Korea 0.8 percent (1.2 percent) and North Korea 0.6 percent (0.5 percent) and none 31.3 percent (33.0 percent).

Question: Please list up to three nations you dislike.

The Soviet Union 55.4 percent (56.5 percent), North Korea 29.6 percent (32.5 percent), South Korea 27.1 percent (22.2 percent), China 5.7 percent (5.2 percent), the U.S. 5.5 percent (7.7 percent), India 5.4 percent (5.6 percent), West Germany 3.6 percent (3.9 percent), Britain 1.4 percent (1.0 percent), France unchanged (1.2 percent), Switzerland 0.3 percent (0.5 percent) and none 35.8 percent (36.3 percent).

CSO: 4120

POLITICAL AND SOCIOLOGICAL

WIRETAPPING OF JCP OFFICIALS' RESIDENCES REPORTED

Sophisticated Wiretapping Devices Found

OW011039 Tokyo JPS in English 0902 GMT 1 Jul 80

[Excerpt] Tokyo, Jul 1, JPS—Sophisticated devices for wiretapping were discovered at midnight of June 29 and in the dawn of June 30 at the residences of Shinichi Takahara, member of the Standing Presidium, and Harumatsu Ebisudani, Presidium vice chairman, of the Japanese Communist Party. Taking the case seriously as it amounts to a Japanese version of the Watergate case, which fundamentally infringes upon democracy, the Japanese Communist Party on June 30 filed a note of complaint with the Supreme Prosecutors Office against unidentified criminals for using unlawful tricks to obstruct the others' business and for violation of the Electric Wire Communication Law. The party the same day issued a statement in the name of the party Standing Presidium and pressed the minister of posts and telecommunications to thoroughly investigate the case.

JCP Statement

OW011041 Tokyo JPS in English 0910 GMT 1 Jul 80

[Text] Tokyo, Jul 1, JPS--The Standing Presidium of the JCP on June 30 issued a statement "We Condemn Anticonstitutional, Antisocial, and Conspiratorial Crimes." An excerpt of the statement follows:

It is very clear that the wiretapping cases against the JCP leaders were committed based on political antagonism to the JCP. There is no room for doubt that these cases are organizational and premeditated crimes committed by conspiratorial groups devoting themselves to wiretapping.

It is also very clear that dirty, antisocial and conspiratorial crimes against the JCP have been and are being committed systematically, whoever committed the crimes at this time.

The action of tapping constitutes an infringement of the secrecy of communication guaranteed by the constitution and of inviolable fundamental human rights. This action can never be tolerated.

This case of wiretapping against public political party leaders is a crime against the JCP.

Like the Watergate case, by which American democracy was put to crisis, Japanese democracy is now in crisis by these wiretapping cases.

In connection with this, we point out that many wiretapping cases against the JCP and its leaders have been committed, and that all of those who had committed have not been arrested. Some of these cases give rise to doubt that the investigation authorities had deliberately abandoned their inherent duties.

The JCP demands again that the investigation authorities inquire into these cases promptly and fairly, and that they severely punish those who committed such crimes. At the same time, the JCP will continue to struggle for investigation into the true fact of these antisocial and antidemocratic crimes.

CSO: 4120

POLITICAL AND SOCIOLOGICAL

SOKAGAKKAI INVOLVED IN WIRETAPPING OF JCP OFFICIALS

OW071025 Tokyo JPS in English 0910 GMT 7 Jul 80

[Text] Tokyo, Jul 7, JPS--It was revealed that members of the group which set wiretapping devices at the residence of Kenji Miyamoto, presidium chairman of the Japanese Communist Party, had been daily contacting the leadership of Sokagakkai (Buddhist sect) since the revelation of the wiretapping was discovered.

AKAHATA obtained a report submitted by one of the wiretapping group, certain Kitabayashi to Sokagakkai chairman (Taisaku Ikeda, then) and vice chairman (Hiroshi Hojo, now chairman) on information activities, and revealed this at the top of [its] social news page. The report concerns a feature article on religion carried by [the] magazine "Hoseki" (jewel) at the end of 1975. It includes the names of the assigned reporters, and the prior investigation of the coverage plan, and is affixed with the signs of chairman Ikeda, and vice chairman Hojo, for an "approval." Until he received a call from AKAHATA on June 21, this year, Teruo Hirano, who had set [the] wiretapping device, lived in a high class apartment house at 330,000 yen monthly, drove around [in a] Benz, and rented another apartment house at 200,000 yen per month to engage in the conspiracy of Sokagakkai-Komei party. After the discovery of the wiretapping case, he moved out, and hid himself.

CSO: 4120

POLITICAL AND SOCIOLOGICAL

JAPAN URGED TO CUT TIES WITH POL POT REGIME

OW040957 Tokyo JPS in English 0913 GMT 4 Jul 80

[Text] Tokyo Jul 4 JPS--AKAHATA on July 4 carried an editorial entitled "Cut Off Diplomatic Relations With a Phantom Regime," severely denouncing the Japanese Government for its continuing support for the remnants of the old Pol Pot regime, and said that they are "of a mere phantom government." Excerpts of editorial follow:

"There is nothing so absurd as the position taken by the Japanese Government, which disapproves the Heng Samrin Government, the present government which has established the effective rule over the entire territory of Cambodia, and effecting the reconstruction of land and the people's living, and on the other hand, to support the remnants of the old Pol Pot regime, which was judged unfit by the majority of the people, and escaped to foreign land, and now surviving as a tool for the international intervention by the U.S., China and Thailand.

"Now the Liberal Democratic Party Government throws out the international reason and its own diplomatic custom to insist on recognizing the 'phantom regime' and maneuver. It is attempting to get the majority support for Pol Pot in the United Nations General Assembly in the autumn. This is very serious in that the Japanese Government is taking part in international interference in Cambodia, and forcing war and desolation on the Cambodian people again.

"The peoples of Indochinese countries desire peace, who suffered from the foreign interference and war, and strongly hope for the independent and affluent country buildup. This is especially so of the keen desire of the Cambodian people, who are laboring for the reconstruction of the country, overcoming difficulties over one and a half year since the liberation. No country will be ever condoned to bring a new war to Cambodia.

We would like to point out again that it will be a response to the voice of many people, who want to save the Cambodian people from difficulties, and will be the way to contribute to peace of Asia and friendship of nations, for the LDP Government to immediately rectify the position running counter to the international justice and reason, and to aid the peaceful reconstruction of Cambodia."

CSO: 4120

MILITARY

NEW ATTITUDES ON DEFENSE BEING QUESTIONED

Tokyo BUSINESS JAPAN in English Jun 80 pp 49-50

[Article by Yoshiteru Oka, Associate Editor, Fuji Evening]

[Text]

WHILE Japanese defense issues have been discussed recently both inside and outside the country, two influential business leaders spoke out recently on a conscription system and the export of weapons.

"I assume it is necessary for Japan to study the possibility of adopting a conscription system for meeting an emergency," said Hosai Hyuga, president of the Kansai Federation of Economic Organizations (Kansai Keidanren), in a meeting, while Shigeo Nagano, president of the Japan Chamber of Commerce and Industry, declared "We should develop sophisticated technology and export our products in response to international demand."

The conscription idea itself isn't new. Nobody denies the rumor that the Japanese Defense Agency has studied or is studying the conscription question. There is nothing wrong in a state organization like the Agency making such a study since the military must consider all possible situations in the defense of the country.

It seemed odd that the issue, that had long been taboo, was brought up by private individuals and senior businessmen. People in general might say "It's nothing new to say..." but in a certain sense, they were surprising statements.

For instance, the Self Defense Force army has about 180,000 members, 86% of the full personnel level. This doesn't mean that the army has recruiting problems. It has kept the number below the limit for budgetary reasons, but has maintained the necessary strength for an emergency. That is to say, there are official requirements and practical ones.

Increasing costs are another reason for keeping the number below the full strength. If the personnel level is raised by 1%, a total of ¥3,170 million is additionally required. Major expenses include ¥2,700 million for personnel expenses, ¥44 million for clothing, ¥40.4 million for food and ¥16 million for medical expenses. These estimates were made on the basis of the lowest paid private second class. How much will actually be needed for defense expenses a year?

Any enlargement of the self defense force will result in more taxes from the people and a reduction in the labor force, which eventually would raise the wages of workers and weaken Japan's competitive power in the international market. Business leader Hyuga made his statement on a conscription system apparently taking

such matters into consideration. As Hyuga was quoted as saying that the study must be made "for meeting an emergency," he might be suspecting that the Soviet troops will sail across the sea and land in Japan today or tomorrow.

It is hard to guess what Nagano meant by saying that the development of sophisticated technology is necessary to export made-in-Japan products in response to international demand. In short, he is advocating the export of made-in-Japan weapons. Arguments for exporting weapons are popular among businessmen, but none of them discuss it openly because they are afraid of being called "merchant of death." In addition to Nagano, Fumihiko Kono, chairman of the Defense Production Committee of the Federation of Economic Organization (Keidanren), is advocating the export of weapons.

It would seem to be natural that business circles would bring up the question of the export of weapons. Nagano and Kono claim that the per-unit cost of weapon production is high because the buyer is limited to the Japanese Self Defense Force. They also claim that the quickest and simplest way of securing the supply of natural resources from the Middle East is to barter weapons for them. They allege that the production of weapons will help Japanese develop sophisticated technology.

Businessmen can be expected to favor the export of weapons to secure natural resources, yet Middle East nations have been supplying oil to Japan without obtaining any weapons, and they could only be exported under certain conditions. This would be contradictory to the wishes of Middle Eastern nations that are trying to purchase weapons without any conditions.

Finally, they claim the development of technology as a reason. It is certain that production of weapons will help the Japanese develop industrial technology, but it is not essential for the purpose. If Japan plans to develop weapons for exports, it must increase research and development expenses, which now account for only 1% of the total defense budget, compared with 12.1% for France and 10.6% for the United States.

Arguments for a conscription system and for the export of weapons may be a brave position to take, but such arguments may be dangerous for the country's future as they may sometimes mislead the direction in which the nation should go. ◻

CSO: 4120

ECONOMIC

BRIEFS

FIRM EMPLOYS CHINESE LABOR--Tokyo, 26 Jun--Niigata Engineering Company, an integrated machinery maker, has initialed a contract with a Hong Kong company to employ Chinese labor for its construction work in Iraq. The Hong Kong firm, Chronical Consultants Limited, is empowered by China's Guangdong Provincial Government to arrange overseas dispatch of Chinese workers. Under the contract, a total of 61 Chinese workers--37 machine operators and other skilled workers, 15 unskilled workers, and 9 supervisers, medical attendants, interpreters, and others--will be sent to Iraq for 1 year to engage in the maintenance and repair of a gas-removing facility constructed by a French firm in Amara, 400 kilometers from Baghdad. They will leave for that country via Hong Kong in September. [OW261431 Tokyo JIJI in English 1327 GMT 26 Jun 80]

CSO: 4120

SCIENCE AND TECHNOLOGY

U.S., JAPANESE SEMICONDUCTOR INDUSTRIES EXAMINED

Tokyo CHUO KORON in Japanese Jun 80 pp 272-295

[Article by Yukio Shimura, journalist: Part II: "Capabilities and Characteristics of Semiconductor Industries in the U.S. and Japan," from special report: "U.S.-Japan Semiconductor War"]

[Excerpt] Face to Face Encounter of High Level Technologies

The terminology of the semiconductor industry is for some reason or other unusually large. That is to say, it started off as an illegitimate child of technological innovation and as food for industry, to now take in basic element type industries, core technology industries, laterally spreading technology industries, knowledge (technology) accumulating industries, research and development type industries, strategic industries, high value adding industries, resource conservation type industries, energy conservation type industries, scale merit (mass production effect) type industries, and countless other industries.

On the other hand, the term which is at the bottom of all these areas and finds maximum use is the term "high level technology industry."

High level technology industry is a leading industry which reflects the fruits of present science and technology, as a result of which there is a latent potential of altering the flow of industry. In this respect, the characteristics of electronics with semiconductors as the central nervous system "greatly expands the capabilities of machines," and this was specially noted here because it is altering the concept of machines.

As is often repeated, man is living in a world based on the three items of materials, energy, and information. The first industrial revolution which occurred near the end of the 18th century is represented by the development of the steam engine. In this manner, matter was tied to the element energy from the three basic items, and tools with energy; in other words, the machines were born.

In contrast to the above, the second industrial revolution, often termed the "information revolution," substitutes man's brain power into the machine which

ties together matter and energy, by which means a new dimension was added to the properties of the machines themselves. The practicalization of microcomputers which are said to be the masterpieces of semiconductor technology has demonstrated this effect better than anything else.

Let me describe a readily available example. The room air conditioners of the past were equipped with self-control capability so that when there was over-cooling or when the interior temperature was excessively hot, the party using this appliance dialed in either intense or weak to adjust the rate of air conditioning to the desired taste, or there was some kind of switching control. On the other hand, air conditioners equipped with a micon have an element called a thermister, which is a temperature sensor (sensing unit) that senses the normal room temperature while the micon senses and estimates the rate of air inflow to provide automated control. To be sure, there is no need to waste human labor, and this approach can be applied to conservation of electric power. When compared to human functions, the sensor takes the role of the five senses while the micon takes over the role of the brain. Even though they are both basic element type industries, the steel industry provides basic material for making the "skeletal system" while the semiconductor industry has the singular characteristic of providing elements of the "nervous system." This is the main reason it is referred to as a high level technology industry.

What comes to mind at this point is that directly after the Intel Company announced the first microcomputer (1971), President Noyes of this company (at that time) was interviewed, and this is what he said: "Even when a steam locomotive was produced, no one purchased it. If it had been a motor, there would probably have been many buyers. It is our intent go have computers serve man just the way these motors would have served." He then emphasized, "The degree of advancement of a present household is determined by the number of motors in use. These motors probably will be replaced by microcomputer in the future." At that time, there were few who believed him, but his statements today seem to be completely borne out.

Another reason the semiconductor industry can be considered a high level technology industry is that it is rich in technological innovations and it represents a rapid rate of advance. The history of IC is distinguished by the challenge of the so-called degree of integration (the number of elements incorporated into a single silicon chip [wafer]). When this situation is considered from the example of an MOS type dynamic RAM, the first chips which appeared in 1970 incorporated 256 bits, which increased to 1 K bits in 1973, 4 K bits in 1975, 16 K bits in 1977, and 64 K bits in 1979 (all these values were at the start of mass production), thereby increasing by a 2^N factor in capacity and following exactly the rule of "annual doubling in degree of integration." Despite the fact that the capacity of chips today is a maximum of 64 K bits, there is still a considerable number of 16 K bits in use. This is because there is still not enough experience in the production of 64 K bit chips, and the cost per bit is still higher with the 64 K bit chips.

The development in VLSI technology has increased the degree of integration of the memory to 256 K bits and to 1 megabit. When one speaks of 1 megabit, this is 1 million bits, which is equivalent to a million transistors. The number of transistors incorporated into the logic circuit of the CPU (central processing facility) of a large computer is said to be 1.2 million, and a megabit chip is its equivalent. Furthermore, the capabilities of such a vast number of transistors are loaded into a single silicon chip not even the size of a fingertip, and there is no cause to question the term "magic cane" used in the modern press.

If one is to draw a conclusion, the semiconductor industry is a central control industry which controls modern-day innovations and is a key industry which determines the marketability of many products. When compared with other high technology industries such as computers, information communication, air and space, or the nuclear power industry, the scale of this industry is small. On the other hand, when one considers that these other industries depend on the semiconductor industry, it is easy to understand why this industry is the indispensable "food for industry," or "fuel."

Role as a Strategic Industry

As discussed above, the IC industry is a representative high technology industry based on modern science and technology, and its impact on industry, the economy, and society is very large as a result. This is why the IC industry is receiving attention as a strategic industry.

The term "strategic industry" is equivalent to what the English term "target industry" signifies, which is sometimes directly translated as "target industry." In any event, it is directly tied in to national targets and industrial policies which lend it strong administrative nuances, as a result of which it is unavoidable that it is surrounded by some burnt smell.

At that time, it was symbolic that this term was brought into the midst of Japanese-American semiconductor friction from the American side.

"The Japanese Government is taking the viewpoint of putting maximum competitive strength into industrial products for incursions into all the markets of the world, and particularly the American market; and is in all-out promotion of target industries while subsidizing special industries" (statement by Vice President Noyes of Intel at a Japanese-American semiconductor seminar).

"Under the coordination and guidance of the Ministry of International Trade and Industry, government and industry (in Japan) are directing their efforts toward industrial coordination, automation, and expansion of industrial scale in specific industries designated as target industries, and government and banks provide the capital which is loaned in the form of government subsidies. This is the type of process used, for example, to set up a cooperative system as seen in the VLSI research which leaves the American

concepts of competition and antitrust with little room to operate" (statement by President Spock of National Semiconductor at the same seminar).

This type of statement is an indication that there are latent national egoism and antisocial elements in the darkness behind the term strategic industry, but these words are often used by governments and industries so that there is no need to ponder too deeply over them. Boldly stating, industries in this category greatly reflect the national will and may become the seed for international unbalance or complications.

Characterizing the strategic industries in a general manner, they are: 1) industries which are essential to safety assurance (including economic safety assurance), 2) industry in line with the country's strategy, particularly industrial policy, and which develops economic strategy on the same track, and 3) an industry which plays a leading role in the various industrial areas, and whose activities exert very great influence on other industries. In this respect, the semiconductor industry can be classified as a unique industry which fulfills these qualifications. Let us next explore these aspects.

First of all, it is probably easiest to explain the relationship between military technology and semiconductors as far as the first characteristic is concerned. A party involved in military affairs is involved with the term "3C technology" (communication, command, control), and it is the semiconductor that is the foundation of this technology. A recent issue of BUSINESS WEEK (4 February 1980) not only predicted a shortage in military supplies in the cold war mood brought about by the Soviet invasion of Afghanistan, but also pointed out that shortage of sem conductors will be a bottleneck to increased production of armaments.

In another direction, Vice President Noyes made the following statement at the ITC public hearing last year as though anticipating such a situation: "Our country's defense attitude relies on a strong electronic industry, and a semiconductor is the "oil" which powers this electronic industry. A weak semiconductor industry weakens the national defense."

Where the second characteristic is concerned, consider the semiconductor industry as an export industry. Ever since its foundling days, Japan's electronic industry has been the recipient of the government's favor in the government's drive toward a "trade oriented country," and the electronic industry has always received the government's warm protection because this industry was considered the ticket to the export industry. Semiconductors are no exception, and it has been promoted through special management laws for the electronic industry (for example, the 1957 Electronic Industry Promotion Special Management Law, the 1971 Kiden Law, and the 1978 Kiho Law) large project system, and subsidies for free operation to enable free IC development.

The United States also has similar intentions, and the Jones Report (January 1969 report of the Japan Watchdog Committee, Trade Subcommittee, U.S.

House Ways and Means Committee) incorporates the statement "as a high technology and capital amassing nation, the United States must take the lead in the development of new technology, and the other countries should adopt labor intensive and low technology intensive industries. Should Japan by chance through subsidies and restrictive trade practices assume leadership in these areas (high technology industries), the following disquieting problems will arise. 'Now what industrial products must the United States come forth with for export?' Should the industries which the United States looks on with greatest favor--computers, aircraft, leading electronic products (author's note: such as semiconductor products)--be overtaken by unfair practices, there is good probability of strong administrative reaction in the United States." A very defiant attitude was displayed in this manner. Be that as it may, the most recent American trade pattern is to sell wheat and soy beans to Japan while purchasing Toyotas, Sonys, and 16 K bit memories to strengthen the image of a "banana country," and it seems to be undergoing dissatisfaction and impatience.

Where the third characteristic is concerned, semiconductors may penetrate all industrial areas as "food for industry" and strengthen the status of basic element type industries or laterally expanding technology in a very qualified manner.

In any event, what is being viewed with interest is that semiconductors are serving as the propulsion force of "the mechatronix age" (synthesis of mechanism and electronics). It was the actual situation that the advent of the electronic wrist watch not only spelled the demise of the former mechanical type wrist watch, but also dealt a staggering blow to the Swiss watch industry through the introduction of electronics. These movements have gone from the precision machine industries to the tool machine industries and then to the automobile industries, and have had a profound effect on their industrial structure, production, and employment.

Japan Pulls Away From the Group Through Quality Control

The Japanese-American confrontation in the area of semiconductors is, in the final analysis, an economic problem, and this industry also being a high technology industry as well as a strategic industry makes the problem that much more complicated, as was mentioned before. On the other hand, if one carefully explores the factors which are responsible, one finds that what was once a relationship in which the United States was completely dominant has suddenly narrowed in gap, and at times this difference is either nil or even to the Japanese favor. The elements which are responsible for this are the industrial strategy, funding capability, research and development capability, production technological strength, and labor strength. The discussion below will treat more specifically those areas in which Japan exploits its "strength," as well as those areas in which there is evident "weakness."

The first item of Japanese strength which can be designated is the high quality of Japanese IC, which is recognized not only within its borders,

but by the Western users as well, and this has been the trigger which set off the sharp rise in exports. It was the common feeling in the past that Japanese products were "cheap and poor in quality," but the recent picture is that the latter half of that phrase has been changed to "good quality."

The AQL (rate of rejects received) is the specification ordinarily used to judge the quality of semiconductor products. This is an index of the number of rejects expressed on a percentage basis when a user purchases semiconductors from a maker, and a smaller value here makes the user happy. The AQL value which the maker guarantees to the user is 1 percent where American makers are concerned and 0.1 percent in the case of Japanese makers. In other words, where one out of 100 American-made IC may prove faulty, this rate is one in 1,000 in the case of Japanese IC.

Looking at these figures, clearly the Japanese makers enjoy superiority here, and it is only natural that the Japanese share of the market is expanding. On the other hand, the American side does not agree in a forthright manner. What then emerged was the quality confrontation.

The American statement in the form of a pledge was to the effect that "both the Japanese and Americans use the same basic production process, and there are no differences in quality and reliability between the two. The AWL represents a tradeoff between cost of testing and price, and it is a mistake to use just this value to establish the superiority of a product's quality." Vice President Noyes is the principal protagonist of this viewpoint, and he made the following statement at the ITC conference. "If there are differences in the Japanese products, these should appear in the data sheets. This is a problem of degree by which a fit can be made to AQL. Assume here that an 0.5 percent deviation is allowable from the data sheet. An industry can select any product with deviation below this level regardless of whether it be American or Japanese, and only the cost goes up (because of the cost of the test)." This is the reason why the ITC report to the United States Senate has the statement "this handling of importers of Japanese goods is considered one of the techniques to invade the market." This is the firm stance of the American makers.

The Japanese side counters this interpretation of the "absolute quality superiority thesis." That is to say, the fine quality of the Japanese products is not a question of whether tests are or are not applied, and the Japanese products have already achieved the nearly blemish-free state in the wafer process (process in which the elements are made) and the assembly process. Director Ouchi of Nippon Electric said "Japan not only has well-established quality control, but has pulled ahead of the United States in the matter of automation so that the quality is built in at the production stage. This is why there is lower cost as well as improved quality. This is why it may be said that Japan is not satisfied with AQL (1 in 100 order) but is pursuing the PPM (1 in 1 million order) level."

As indicated by Mr Ouchi, there is a pronounced trend to regard the high quality of Japanese produced IC as the result of Japanese quality control (QC).

The seminar entitled "Quality Control--Key to Japan's High Productivity" which was held in the United States, in Washington, this past March under the sponsorship of the Japan Electronic Machine Industry Association was based on such a viewpoint, and this turned out to be a good opportunity for PR in the presence of the many government and congressional figures who had attended this seminar.

Toshihiko Kubo, consultant to Hitachi Limited, who was in a group leader status at this seminar, while pointing out the superior nature of the American professional baseball teams compared to the Japanese, stated "we also learned about the electronic industry from the United States, and the reason Japanese electronic products today are being highly evaluated internationally can be attributed to quality control which was introduced in an original manner, as a result of which the cost effectiveness was heightened and products of high reliability became available.

Summing up the features of Japan's QC in a single statement, Japan has come up with an original development in the form of TQC (total quality control). TQC not only involves the application of statistical QC methods to the production area, but also to the various stages of design, production, and sales. The aim is to conduct QC which is systematized throughout in order to provide the customer with a product of quality at a fixed level or better. What is different from the United States is the QC program in which everyone participates based on the on-site principle, and its outstanding feature is that all the workers understand the scientific significance of QC. When Nippon Electric Kyushu, which is the top LSI plant in Japan and among the top in the world, received the coveted Deming award, it was a most interesting event. Dr Deming wrote in a very recent issue of the journal QUALITY (February 1980) the statement "Japan's strength was realized through 'faith' in statistical quality control."

In this sense the aforementioned seminar at which speakers from the American side were also asked to participate turned out to be a good opportunity to demonstrate "Japan's stand." Among those present was R. Anderson, general manager of the Data System Branch of the world-famous instrument maker, the Hewlett Packard Company, who said that because of the lack of a 16 K bit memory, he had looked into the use of Japanese products, whereupon he found the quality to be much superior to the American products, and presented the data shown in Table 5. He added the comment that "quality control in the United States meant the number of inspections, while Japan starts off from the outset to reduce the number of inspections." He also added "there are lessons the United States can learn from Japan."

Table 5. Quality of 16 K Bit Dynamic RAM

1 供給者	2 受入検査拒否率 (%)	3 フィールドでの不良率 (%/1,000時間)	4 総合的な品質水準
J 1	0	0.01	89.9
J 2	0	0.019	87.2
J 3	0	0.012	87.2
A 1	0.19	0.09	86.1
A 2	0.11	0.059	63.3
A 3	0.19	0.267	48.1

(注) 米国ヒューレット・パッカード社資料
5 J:日本半導体メーカー、A:米国半導体メーカー

Key:
1. Supplier
2. Rejection rate at time of receipt (%)
3. Reject rate in field (%/1,000 hours)
4. Overall quality standard
5. (Note) Data supplied by the Hewlett Packard Company of the United States.
   J is Japanese semiconductor maker
   A is American semiconductor maker

Speaking about lessons from Japan, the writer visited a Motorola plant in Phoenix, Arizona a few years back and saw the words "improve reliability" written in Chinese characters on the plant wall. While this technology was originally learned from the United States, it is now the situation that the United States is in a stage of "reverse introduction."

While some unexpected thoughts may arise, when one talks about automation, Japan is now considered a "leading country" in this area. In the early 1970's when mass production of IC had started, the American makers introduced plants in the cheap labor Southeast Asia sphere to perform the labor intensive assembly, but Japan depended solely on its domestic labor. On the other hand, this turned out to be a fortunate turn of events because the shortage of labor as well as its high cost left no other recourse but to turn to automation. At the present time, many of the Japanese semiconductor makers have introduced a bonding system utilizing pattern recognition technology for the wire bonding process (process for connecting the electrode section of the chip and the electrode section of the container), which is the process requiring the most labor, and in which women workers follow the process under microscopes. When such practices are introduced, not only is productivity increased, but wiring misses and position deviations are eliminated, and product reliability improves, as is to be expected. When compared to the American product which still depends on hand wiring as before, there is no question of the better quality.

The above discussion can be summarized in the following manner. The Japanese semiconductor industry surpasses the American industry in both quality control capability and reliability control capability, and it has installed mass production which determines one's success or failure in the market as one of its arsenal items.

Pursuit of Mass Production Through Investment Strength in Facilities

It was last September when the American Mostec Company, which wields considerable strength in the memory market, sold about $350 million in stocks to the conglomerate industry United Technologies. When President C. Proslo Mostec visited Japan just after this sale, he was asked the reason for this sale, and he said, "We also heard from another conglomerate, the Gould Conglomerate, which offered $42 a share, but we opted for the United offer of $62. This gave us the necessary capital, and we hope to use $200 million in plant investment." Here there were no misgivings of selling one's self into bondage, as is a pessimistic Japanese reaction or sense of defeat, and he seemed to be thoroughly enjoying the situation.

The reason the Mostec Company was willing to part with its stock in order to acquire capital was that the semiconductor industry is a merit scale industry. This feature is displayed in its extreme form by the "learning curve rule" proposed by the Boston Consulting Group, and it has been demonstrated through experience that when cumulative production doubles, the price or cost is lowered 27.6 percent.

This type of rule cannot help but put industry in hot pursuit of mass production. First of all, greater production volume makes possible more takeup in cost, and it becomes possible to realize a higher profit margin than other companies. At the same time, as cost is lowered, cuts in prices can be effected ahead of other companies, and market leadership can be grasped. When this occurs, the so-called survival of the fittest concept comes into play, and makers with small production volume are hard-put for profits and become beaten dogs. For this reason, when the background of the so-called semiconductor battle is reviewed, the problem of investment power in facilities comes under scrutiny.

Japan is blessed with some advantageous conditions in the matter of this investment strength in facilities. Japanese semiconductor makers are large composite type industries which extend from instruments to parts, as a result of which they have strong fiscal foundations. Consequently, assuming that the capital invested is not recoverable, there is strength in that this risk can be absorbed in other areas. Around 1970, when Japan's IC industry was considered "an industry without profit," between 40 and 65 percent capital with respect to sales was put into plant investment because the IC industry was considered "a must industry," but it also demonstrates the merit of accompanying businesses.

This desire for active investment in facilities has continued until today. Although the ratio of investment to total sales has dropped to about 20 percent as the result of a sharp rise in sales, it is still an average 5 percent higher than the United States. The fact that there has been a boom in demand the past few years should be noted, yet the total investment has been climbing upward to between 70 and 75 billion yen in 1979, and is expected to increase by 30 percent in 1980. It is the usual statement in IC

circles that "plant investment of $.75 is required in order to increase sales by $1.00 per year" (this was originally $.50, but went up with increasing costs), so an investment of 75 billion yen should increase the following year's production to 100 billion yen.

Now, what is the situation in the United States. The large makers are not in too bad a situation, but many of the medium and small makers are having capital shortage problems. When one speaks of American semiconductor makers, they are all businesses with total sales less than $1 billion, except for the number 1 TI and number 2 Motorola, and these include businesses such as National Semiconductor. In addition, many are venture business type special enterprises which are finagling meager capital in bicycle type operations, and plant investment is something which cannot be considered. This is why some of the medium-sized makers have reached their limits in business expansion, and they are resorting to capital participation by other businesses both domestic and foreign. What is outstanding is the participation of the giant industries and the advances in the Western European family businesses followed by the inroads of Japanese business. This is why there are many who feel that one of the factors responsible for the Japanese-American friction is the problem of the American industry in the form of the problems of medium and small businesses, particularly those industries concentrated in Silicon Valley. The American semiconductor giant TI is staying out of this situation and maintaining a calm attitude.

Side View of "Cultural Friction"

"It would not do for the different sources of friction between the United States and Japan to stem from cultural differences. We must overcome these factors and consider means of reducing this friction." These were the words of President Carter when he addressed the Japanese-American Scholars Conference, mainly directed at the Japanese representatives. On the other hand, should one look below the surface of Japanese-American friction, one will find that the so-called noneconomic factors such as differences in culture, nationalism, system, and customs come to the fore.

One of these factors is the problem of the Japanese disposition. As is evident from the meager number of Nobel laureates, Japan is not blessed with exceptionally brilliant brains; however, it is not completely devoid. That is to say, the majority are blessed with an average type brain such that there is a considerable brainpower concentration in the society as a whole. It may be said that this situation is well-adapted to the skilled production of products of a given quality. I recently met Vice President R. Graham of Applied Materials, which is a representative semiconductor production company of the United States, and he stated, "The reason Japanese semiconductor product quality is being rated highly is the high intelligence level which permeates the entire working force, including supervisory personnel, technologists, skilled laborers, and general workers, and the desire to further expand on their knowledge."

As if to verify this statement, there has been the following statement on "Japanese superiority" from a representative of the Japanese industry. "While it cannot be denied that quality control is completely enforced in the Japanese plants, there is also the synergistic effect of the studiousness and high level of intelligence on the part of the workers such that quality is built into any product manufactured" (Director Ouchi of Nippon Electric).

"A Japanese worker is steady and always puts forth his maximum effort, as a result of which he is able to produce flawless products comparatively readily. Naturally, reliability is high, and this enables the Japanese to take over the market, which can readily become the cause of conflict" (President Kazuo Inamori of Kyoto Ceramics).

The Japanese lifetime employment system and the workers' allegiance are also responsible for this favorable Japanese industrial position.

Until very recently, economists and business analysts were discussing this lifetime employment system and seniority preference system as being deterrents to the modernization of Japan, and they claimed that Japan would lose out to the advanced Western nations unless it introduced complete fluidity in labor to exploit maximum capability. The present situation is that an opposite path is being followed, as is gradually becoming evident.

No matter what may be said, the lifetime employment system increases the feeling of the worker that he belongs to the industry. As a result, the worker of a company puts his fate together with the fate of the company. As the company's business expands, the worker's income will also increase, and any expansion on the part of the company will improve its position in society. These are the motivations which are generated.

At the same time, the lifetime employment system is very effective in producing fully trained workers. The semiconductor requires high level equipment for its production, and the industry is considered a technology intensive industry; however, there are many facets which require the human element. Such being the case, experience becomes even more important, and 10 to 20 years' experience will more likely be better than 2 to 3 years' experience.

When this situation is compared to that in the United States, the atmosphere of American industry seems extremely dry, and the company and workers maintain independent relationships. Because of the individualism basic to the United States, each individual worker maintains his separate existence at all times even though employed in the same company, as a result of which any feeling of togetherness with the industry is very faint, and there is even lack of togetherness between the workers themselves. This is why a worker can only think of the work assigned him, and he quickly moves elsewhere to any place where the pay is better, which is the normal course of events. While this occurred some time ago, there was an article in an

American journal which stated, "If Japan's capital were the same as the United States', how would the American laborer compete with the Japanese worker who sings his company song and arm wrestles during his lunch period in order to keep himself fit?" In contrast to the Japanese worker, the American worker has a bottle of cola in one hand. While there may be good and bad in either posture, the real question is the quality of the work. The recent move on the part of a segment of Silicon Valley makers to direct efforts in educating their workers is the result of the makers recognizing their weaknesses.

Speaking of differences in culture, when Nippon Electric purchased the Electronic Arrays Company and attempted to have the workers take off their shoes, the attempt was a complete failure. Rubbish and dust are the worst enemy in the production of semiconductors, and many of the operations are conducted in clean rooms as a result. On the other hand, when dealing with people who are not accustomed to removing shoes, such as the Europeans and Americans, time is required just to understand why. Is it not possible that this difference in cultures is somehow tied in to the difference in production technological strength between the United States and Japan?

The United States Is Advancing Through Its Technology Development Strength

According to the survey conducted by the Gelman Company at the request of the National Science Foundation (NSF) of the United States, the number of products evaluated by a fixed set of standards thought to represent technological innovations on a worldwide basis number 163 items for the 6 years following 1968, of which the United States accounted for 56 percent, the United Kingdom 17 percent, and Japan but 10 percent. The degree of contribution of research and development to industrial development was clearly small compared to the economic strength in the case of Japan.

This is a situation which can be applied as is to the semiconductor area, and this represents a strength of the United States and a weakness of Japan.

Looking at this picture from a historical standpoint, the series of developments associated with the transistor had as its inception a product of the Bell Laboratory group headed by Shockley. The first item was a point contact transistor, which was quickly followed by the junction type transistor, mesa type transistor, MOS type transistor, and junction type electric field transistor. It is said that the history of transistors can be obtained simply by looking at the efforts of the Bell Laboratory.

The idea of IC itself was proposed by the Royal Radar Laboratory of the United Kingdom, but the specific technology was evolved mostly in the United States, as evidenced by the basic mechanism patents issued to the TI Company, the Brener patents issued to Fairchild, and the selective diffusion patents issued to Western Electric. As a result, the Japanese IC makers were burdened with payments in patent royalties amounting to 10 percent of the total sales, which was responsible for the high cost of their products (on the

other hand, these payments decreased with the years, and the patent rights will all run out this year).

The author has at his side the "Semiconductor Development Time Table" commemorating the 25th year of the development of transistors (original subject, "The Quiet Innovation"), and the only contribution cited from Japan is the tunnel diode which was discovered by Esaki.

One of the reasons Japan is behind in the area of technology development strength is the lack of soil which breeds originality. Japan is woefully behind in the number of inventions, discoveries, and Nobel laureates, and this lack of originality is the subject of frequent discussions. What I would like to present as a problem here is the social foundation which cultivates such an environment. Professor Junichi Nishizawa of Tohoku University, who was awarded the Japan Academy prize for his invention of SIT (static induction transistor), said "creative work is not only very rarely recognized in Japan, but there even seems to be an allergic reaction. Whatever the reason, there is no evaluation system, and the end result is the lack of positive incentives." He registered his disappointments in this manner. About 10 years ago, this professor contacted one of the top personnel of the Telephone and Telegraph Public Corporation and explained the importance of photocommunication, but this conversation ended without much success because of the lack of understanding on the part of the other party. While there is ample tolerance for established targets which everyone understands, there is little room for any effort which involves the digging out of untrod technology and develops by way of original judgment.

It is imitation that is at the background of this light regard for originality. This is an event which happened about a year ago. While testifying at a hearing on IC design patent problems to a House of Representatives subcommittee, President A. Grob of Intel displayed two photographs of circuit patterns and said, "Of these two photogtaphs, the 4 K bit static RAM was imitated by the T Company of Japan, while the 4 K bit dynamic RAM was copied by Soviet industry," as he complained loudly of these incursions.

While it is not complete imitation, it can be perilous to follow a principle of always following the United States and Europe (actually the United States). It was commonplace until very recently to hear in Japan the statements "we have run out of seeds for research and we need to go to the United States for more leads," and "learn instead of thinking." This environment still has not completely dissipated. There was an article entitled "Japanese Spies in Silicon Valley" (appearing in FORTUNE magazine of 27 February 1978) which was full of calumny, and demonstrates a malady which results from this background.

There is also the problem of the attitude which seeks to avoid risk in research and development. Japanese research and development is characterized by a major feature of trying to achieve maximum effect from minimum cost, and it is said that the rate of success versus the number of projects is

the very high level of 70 percent compared to the less than 1 percent of the United States. This in itself may not be bad, but should too much effort be directed toward modification type research to assure a greater degree of success, or the efforts end up in secondary research, no breakthrough type (technological breakthrough) results can be expected.

This trend toward safe operation to avoid risks also appears in the area of product development. This is the pursuit of the merits of so-called post developments. At the same ITC conference Vice President Noyes of Intel said, "The most important first step in the development cycle of a product is exercised here in the American market, and American industry undergoes considerable sacrifice to this end. About 1 year after development has ended, many competitors appear with the same product. Japan achieved this with the 16 K bit memory." He further added in a biting manner, "Once the market situation becomes clearly established, Japan makes immediate utilization. There is very little danger of erroneous calculations in the sales strategy. The Japanese are conducting a very elegant business." The reason Japan, which is a latecomer in the field, is exploiting its strength in the area of production technology is actually attributable to a completely different reason as discussed above, and Japan incorporates a weakness such that the statements of Vice President Noyes cannot be dismissed as being one-sided.

When I approached Director Ouchi of Nippon Electric with this subject, he answered, "In the past we had our hands full just trying to catch up, but we have developed considerable strength in the area of research and development." At the same time, he added, "Even in the papers selected for presentation at the 'International Solid State Circuit Conference' (ISSCC), which is the most prestigious international meeting on semiconductors, the number of papers presented from Japan was but a handful 10 years ago, but the recent picture is that Japan accounts for more than one-fourth of the 100 or so papers. In this situation, the population ratio (the Japanese-American ratio in the number of science and engineering students is 1:3) is the only difference." Japanese industry seems to be fixed to the idea that there is a difference, but a very minor difference.

[Conclusions] Direction for the 1980's and Path to Easing Friction

Friction between Japan and the United States on the subject of semiconductors appears to be presently at a state of temporary rest with the background of expanded demands from heretofore nonexisting markets in both Japan and the United States. On the other hand, it is evident from the statement by Representative Banick, chairman of the House Trade Subcommittee, Ways and Means Committee, on his visit to Japan this past April, when he said, "We hope Japan will soon modify the policy of a duty-free barrier with regard to American semiconductors," that the semiconductor problem will be the main theme in Japanese-American economic friction through the 1980's as far as the author is concerned.

The first reason here is that the expected rapid growth in the semiconductor market in the 1980's (the annual rate of growth in the world market is of the order of 16 percent) will sustain Japanese-American struggles for the market at a feverish pace. In this situation, the strides made by Japan stand out, and it is rapidly closing the gap with the United States, as a result of which American irritation cannot help but increase.

Secondly, the United States has incorporated the semiconductor industry into its first-line strategic industries along with the computer industry, air and space industry, and nuclear power industry, which it is determined to defend to the death. If semiconductors are lost, the computer industry will be endangered by a chain reaction effect, and maximum effort will be directed at preventing such an occurrence.

Thirdly, there are many internally contradictory items in the industrial policies and industrial problems which the United States supports and faces which are factors responsible for Japanese-American friction, and criticism of Japan is serving as a scapegoat for this situation. In this manner, there is the element of criticism for criticism's sake that is present, and this is a situation from which there is no outlet.

Because of the reasons cited above, there is little hope for resolving in a comprehensive manner these confrontations between the United States and Japan, including that concerning semiconductors. On the other hand, pathways of easing this friction have been left open, and just how to select these pathways may be the subject which Japanese and American industries need to investigate.

Considering this situation from the Japanese standpoint, Japan should make greater effort to inform its competitor of the manner in which domestic industry is handled. The arguments presented from the American side often stem from ignorance or erroneous information of the Japanese situation, and these are causing the attitudes of both sides to deteriorate to greater than necessary levels. Compared to what information the Japanese have of the United States, the Americans' knowledge of Japan is vastly inferior. In this sense this information gap should be recognized as another factor responsible for this friction.

In addition, the advances Japan makes into the American market must be through an ordered and restrained approach even though based on the free market principle. When Nippon Electric was about to open a plant in the United States, the American side said, "We have to welcome you as a matter of principle," but this was a situation different from, say, the opening of an automobile plant. It hardly seems possible that the opening of a semiconductor plant which has little effect on employment and supply of parts will be a particularly effective medicine for easing the friction. Not only that, but should this result in a broad advance on the part of the entire Japanese industry, reaction from the American side is certainly going to be reinforced. It is to avoid such happenings that there must be controlled

advances based on mutual understanding and greater attention to mutual Japanese-American extensions. Very recently, the Intel Company opened a VLSI design center (Tsuchiura City in Ibaraki Prefecture) while Japan TI expanded its facilities, and these are desirable events when seen from the viewpoints just described.

Finally, Japan must direct greater attention to the development of independent technology. When the background of intensification of Japanese-American confrontations and reduction in difference in technological strength is considered, Japan should no longer rely on the pattern of one-sided introduction of technology from the United States. In this sense, "Japan must emphasize basic research more, and direct more capital in its direction. When the government sets up its budget, it immediately questions the objectives and effects. It is often the case in basic research that no one knows what will be forthcoming, and there can be spinoff effects even though the initial research and development objectives were not attained. If we are to function in this world as a truly economic giant, the time has come for us to put aside all difficulties and tackle this problem." This is the proper course (as enunciated by consultant Kubo of Hitachi Limited).

I reiterate in conclusion that the Japanese-American semiconductor friction is one with no outlet. On the other hand, any attempt to shine but a single ray of light into this dark tunnel should prove to be a sensible direction to both industrial circles.

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SCIENCE AND TECHNOLOGY

STEEL PLATE RESEARCH, DEVELOPMENT ADVANCEMENTS REPORTED

Amorphous Steel Technology Developments

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 5 Mar 80 p 5

[Text] The Research Development Corporation of Japan (director, Yoshimitsu Takeyasu) is planning to commence development of technology for practicalization of an energy-saving transformer amorphous electric steel plate starting from fiscal 1980. According to a disclosure by related sources, it has been informally decided that Nippon Steel (president, Eishiro Saito) shall be commissioned to take charge of the development, and several major U.S. transformer manufacturers, such as GE, have expressed their desire to join in the development project. With a total research expense of 1 billion yen for a 3-year plan based upon technology developed by Professor Takeshi Masumoto of the Metal Material Research Institute, Tohoku University, the principal objective of this project will be construction of a demonstration plant with a production capacity of 50 tons a month. The contract will be officially signed out to the commissioned party by this summer. Also, for participation of U.S. manufacturers in the project, it is most likely that the domestic contractor and the U.S. manufacturers will cooperate in the field of developing its use, since there is no percedent where a foreign business firm has ever contracted a project directly from the corporation. Amorphous electric steel plate is also being enthusiastically developed in the U.S., using funds from the Electric Power Research Institute (EPRI), contributing to rising U.S.-Japan competition. Judging from the fact that U.S. manufacturers have approached our country, it seems that Japan is considered to be one step ahead in this technology.

Amorphous magnetic material is an innovative material which exerts an energy-saving effect. The primary characteristic of this material is found in its manufacturing process. The presently available transformer sheet silicon steel plate requires more than 10 processes, including rolling, heat treatment, cooling, etc. for acquiring its characteristics. This is a serious problem to the iron manufacturing industry from the point of energy conservation.

In contrast, "amorphous" is made into a serviceable material by rolling fused material only once. So-called energy-saving direct manufacture is possible with this material. Specifically, when fused metal is cooled at an ultra-speed of 500,000 to 1 million centigrade a second, amorphous metal is instantly obtained. By this ultra-speed direct manufacture, the new process can save 1 liter of oil per 1 kg of steel plate compared to the conventional silicon steel plate manufacturing process. That is a yearly energy-saving effect of 1.2 million tons.

Also, a second characteristic is demonstrated in that the power loss is greatly reduced when amorphous electric steel plate is used as an iron core material for electric machinery and equipment. Power loss (iron loss) of the currently used silicon steel plate transformer is 0.85 wt per 1 kg, while the same loss can be reduced to 0.15 wt when "amorphous" is used. The total energy savings by application of "amorphous" is estimated to be as much as 1.45 million kl per year in terms of oil.

Aside from these energy-saving effects, there are many more features: Amorphous electric steel plate thickness can be reduced at a stretch to some tens of microns, whereas the thickness of the silicon steel plate is limited to the 100 micron level; it facilitates miniaturization of transformers; processing yield is increased to 80 percent from 40 percent of silicon steel plate.

On the other hand, there are some shortcomings. Material costs are high, and its characteristics may be vulnerable to changes with time due to the alloy compositions of iron, boron and carbon.

Because of these, the following will be the major issues to be solved in the future: (1) Establishment of a manufacturing process for wide and long sheet plates over 40 cm wide in contrast to the current process which produces sheet plate slightly less than 5 cm wide; (2) Development of a potential mass-production technology; (3) Development of an alloy with minor temporal changes and a high thermostability; (4) Selection of an alloy composition which readily becomes amorphous.

Development of energy-saving amorphous material is eagerly pursued not only in Japan, but also in Europe and the U.S. Especially in the U.S., Allied Chemical and Westinghouse have been working jointly since 1978 to construct a demonstration plant as a national project using EPRI funds (approximately 12 billion yen). In addition, national basic research unions have been installed for operation and continuation of research in West Germany and England starting from 1978. However, Japan and the U.S. are technologically in the top class, and the competition between the two is, in fact, menacingly tough.

High Silicon Steel Plate

Tokyo NIHON KOGYO SHIMBUN in Japanese 5 Mar 80 p 1

[Text] While amorphous electric steel plate is capturing attention as a dream-come-true energy-saving iron core material which greatly reduces the power loss of transformers and motors, Kawasaki Steel (president, Eiro Iwamura) disclosed its pursuit of the development of a new material, "high silicon steel plate," which would rival the amorphous plate. It has been unofficially decided by the Research Development Corporation of Japan to contract an amorphous development project with the top silicon steel plate maker, Nippon Steel, starting form 1980, at an investment of approximately 3 billion yen from national expenditure. The reaction of the remaining silicon steel plate maker, Kawasaki Steel, to this decision has been watched with interest. Although it says its project is "still in the laboratory stage," Kawasaki Steel takes a position to challenge "amorphous" head on, and says, "We aim at practicalization in 3 years" in answer to frequent inquiries by electric machinery manufacturers. A fierce competition in developments is likely to be unfolded between the two companies.

Presently, silicon steel plate which contains approximately 3 percent silicon is used as an iron core for transformers, motors and generators. This silicon steel plate, among iron and steel manufactured products, is a typical intensive technology type manufactured product which requires the most advanced technology and equipment. In Japan, two companies, Nippon Steel and Kawasaki Steel, dominate this market (combined production: approximately 1 million tons per year). However, the power loss (iron loss) incurred by eddy currents which are generated with transmission of electricity is in no way negligible.

A transformer gets hot or starts vibrating because of this. It is said an annual power loss of 8 billion kw/h is attributable to transmission transformers of the power companies. This value is equivalent to approximately 2 percent of the total power generated in Japan. The power loss figure will be further inflated if the loss by general motors is added to the calculation.

Awareness of the significance of the loss contributed to the initial energy-saving electric steel plate development. The amorphous steel plate without a crystalline structure, which is to be developed by Nippon Steel, is said to recuce the power loss (i.e., iron loss) to one-fourth to one-fifth of the currently available silicon steel plate.

In comparison, Kawasaki Steel aims to realize an energy-saving steel plate by raising the silicon content approximately two times more than the current percentage, to 6.5 percent, which is recommended by the results of research by Professor Noboru Tsuya and his group at the Electrical Communication Research Institute, Tohoku University. It has been known in the past that an increase in silicon content contributes to a reduction in iron

loss. However, a plate usually becomes suddenly brittle with a silicon content over 4 percent, which has held off the practicalization of the concept. Professor Tsuya and his group conquered the previous obstacle by inventing a direct sheet 6.5 percent silicon steel plate manufacturing process whereby fused steel is sprayed on a high-speed rotary roll and quenched and solidified. The Kawasaki Steel research group believes, "Problems related to practicalization will be fewer with this plate than with the amorphous steel plate."

Concerning the iron loss itself, this material is inferior to "amorphous," still allowing 60 percent of the loss by the currently available silicon steel plate, compared to amorphous steel plate, which claims to reduce it to one-fourth to one-fifth. Nevertheless, amorphous steel plate is anticipated to have some problems related to thermostability. The amorphous condition is deteriorated by heat and crystallization sets in. It is considered beyond its nature to use "amorphous" for transformers which demand a nearly 30-year service life. Providing a long service life is one big problem. Meanwhile, 6.5 percent silicon steel plate has the same crystalline substance as currently available silicon steel plate, and is completely free of this thermostability problem.

Additionally, although it is presently not possible to increase the thickness of the amorphous steel plate above the 50 micron level, 6.5 percent silicon steel plate thickness has already reached 100 microns in the laboratory stage, and they say it can be thickened even more. The large-size iron core is manually laminated sheet by sheet. A thickness of the 50 micron level is too thin to carry out this lamination smoothly. The new silicon steel plate is advantageous even in this light.

Another merit to consider compared to the presently available silicon steel plate is the drastic simplification of the manufacturing process, which leads to energy savings. The currently available silicon steel plate requires three rollings and five heat treatments. However, the new process makes sheet directly from fused steel.

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SCIENCE AND TECHNOLOGY

NEW PROCESS FOR URANIUM EXTRACTION FROM SEA WATER DEVELOPED

OW281051 Tokyo THE JAPAN TIMES in English 27 Jun 80 p 2

[Text] A group of Kyoto University researchers has developed a new method of extracting uranium from sea water by using low-cost quicklime, it was learned Thursday.

The group, headed by Professor Taichiro Fujinaga, succeeded in producing uranium and magnesium hydroxide through a chemical reacting of sea water with quicklime.

Researchers of many countries are now developing various methods of uranium extraction from sea water. Most of them are studying the method of applying absorbents to the sea water.

Fujinaga said that the cost of his method is much lower than that of the conventional method of uranium production using absorbents because quicklime is very cheap.

His group developed the new method by improving Dow Chemical Co.'s technology for extracting magnesium hydroxide from sea water.

Fujinaga said that, even if his new uranium and magnesium production method is used for commercial purposes, it will probably not infringe on the patented technology of the U.S. company which is only for magnesium production.

It is possible to produce uranium and magnesium on a commercial basis using this method, he said, because the production cost is low and because not only uranium but also magnesium can be produced.

Sea water contains sodium, magnesium and uranium, among other substances. The uranium content is about 3 milligrams per ton of sea water.

Because of the small uranium content, it is necessary to process a volume of sea water equivalent to Lake Biwa in order to obtain the amount of uranium needed for an average-sized nuclear power plant, Fujinaga said. Under his method, only 200 grams of quicklime are required to process a ton of the sea water, according to Fujinaga.

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SCIENCE AND TECHNOLOGY

SHARP DEVELOPS CAD SYSTEM FOR CONSUMER ELECTRONICS

Tokyo NIHON KOGYO SHIMBUN in Japanese 6 Mar 80 p 1

[Text] Sharp (President: Mr Akira Saeki) on 5 March disclosed the successful development of a computer assisted design (CAD system employing minicomputers, for consumer goods such as color television and audio equipment, from the design of the conductor pattern of printed circuit boards to the production of NC tape for machines automatically inserting electronic components. This is the first system in the world dealing actively with introduction of microcomputer control for making consumer equipment, and in addition to automatic design of analog circuits, it has the ability to design digital circuits on the same substrate. It has the great merit of being able to handle in about one day design work that previously took about 10 days. Orders for the system, together with software, started to be received on the 6th, and a large number of orders are expected from domestic and foreign makers.

In the industrial world, rationalization has steadily progressed year by year in the field of production, but so far design has been representative of the departments left behind by rationalization. Expecially in the consumer electronic equipment trade, where the number of product lines is increasing as a result of the diversification of user needs, and among which the lifetime is generally short, the shortening of the period of product development is an important key. The automation of design work is an important topic, because of the circumstance that the industrial world as yet has recourse to the work of design technologists, and also to cover the scarcity of design technologists.

The CAD system which has been developed, based on the original drawing prepared in advance by the circuit designer, inputs the necessary data via a coordinate analyzer (digitizer); after this, there are automatically prepared by means of an interactive graphic display system: (1) a mask of the conductor pattern, hitherto made by manual taping, (2) resist mask for soldering, (3) drawing of characters and symbols for printing (silk printing drawing), (4) positions for holes to be made, (5) machine NC tape for components insertion, and (6) using the digitizer a second time, circuit diagrams for use in sales manuals. Obtaining the NC tape

(for insertion machines) for use in a CAM (computer aided manufacturing) system aiming at the automation of production is a big special feature among these.

The point of this system is that the input data are (1) names and position coordinates of components, (2) kind and position coordinates of conducter pattern, (3) characters and their position coordinates, (4) data defining each component, etc. A maximum of 14 layers high can be very rationally handled by means of the cursor and numerous menu sheets of the digitizer. Only to avoid trouble from oscillation accompanying stray capacities in the conductor patter, drawing of the specified position coordinates in stages is demanded; thereafter, it is said that a strictly all-automated system can be aimed at. The input raw data are stored on disks (16 bits per component point), and, based on the manufacturing program, the lands where the component leads enter and the tapering of the connecting part to the circuit are automatically carried out. Kanji, hirangana and katakana can even be handled by means of the built-in character generator. Apart from this, approximately 10 programs are provided in the software for change of data display and revision on an interactive basis.

The basic system consists of minicomputer (DEC PDP-11), graphic display, console typewriter, character display, and paper tape and punch. The selling price is 60 million yen. The standard software for analog circuit use only costs 25 million yen.

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